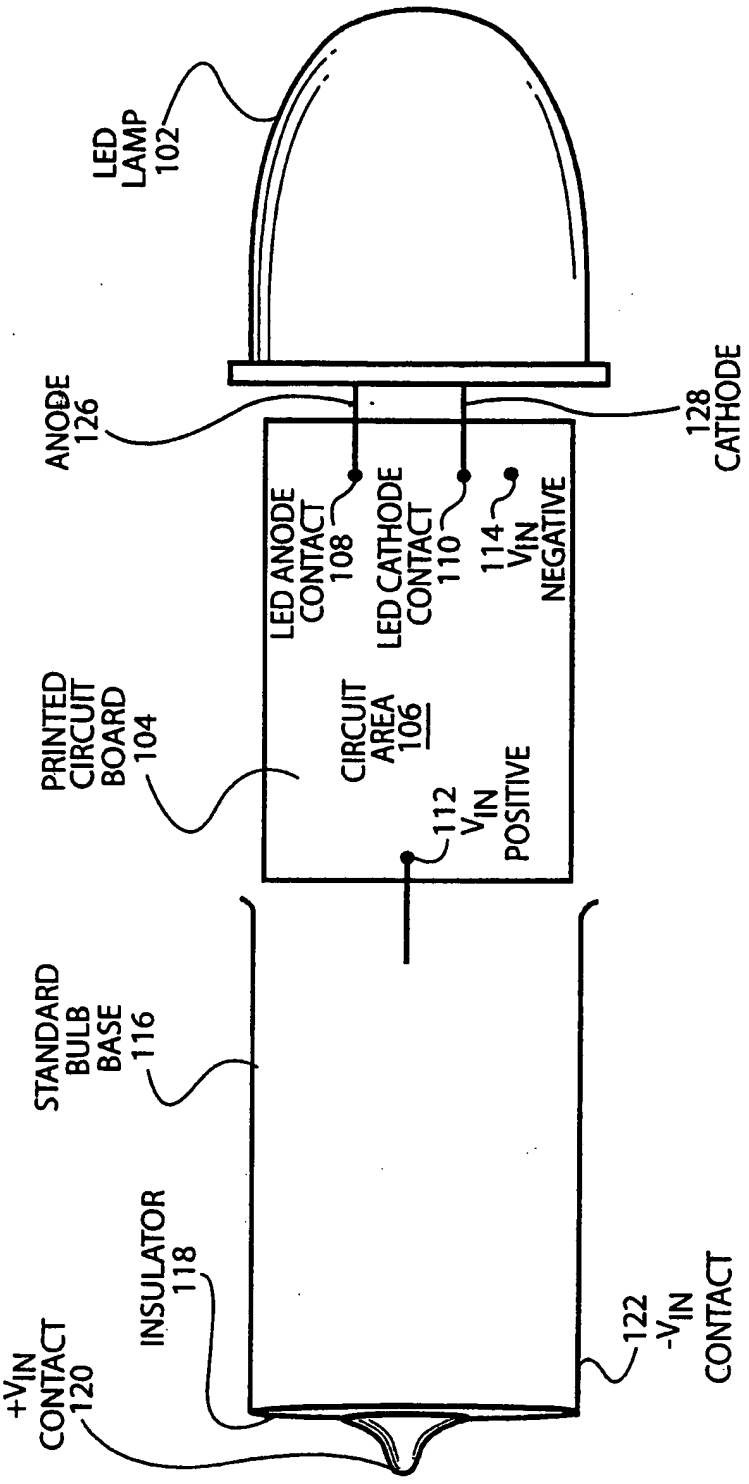

LED LAMP 102
ANODE 126
128 CATHODE
LED ANODE CONTACT 108
LED CATHODE CONTACT 110
114 V_{IN} NEGATIVE
PRINTED CIRCUIT BOARD 104
CIRCUIT AREA 106
112 V_{IN} POSITIVE
STANDARD BULB BASE 116
INSULATOR 118
$+V_{IN}$ CONTACT 120
122 $-V_{IN}$ CONTACT

FIGURE 1

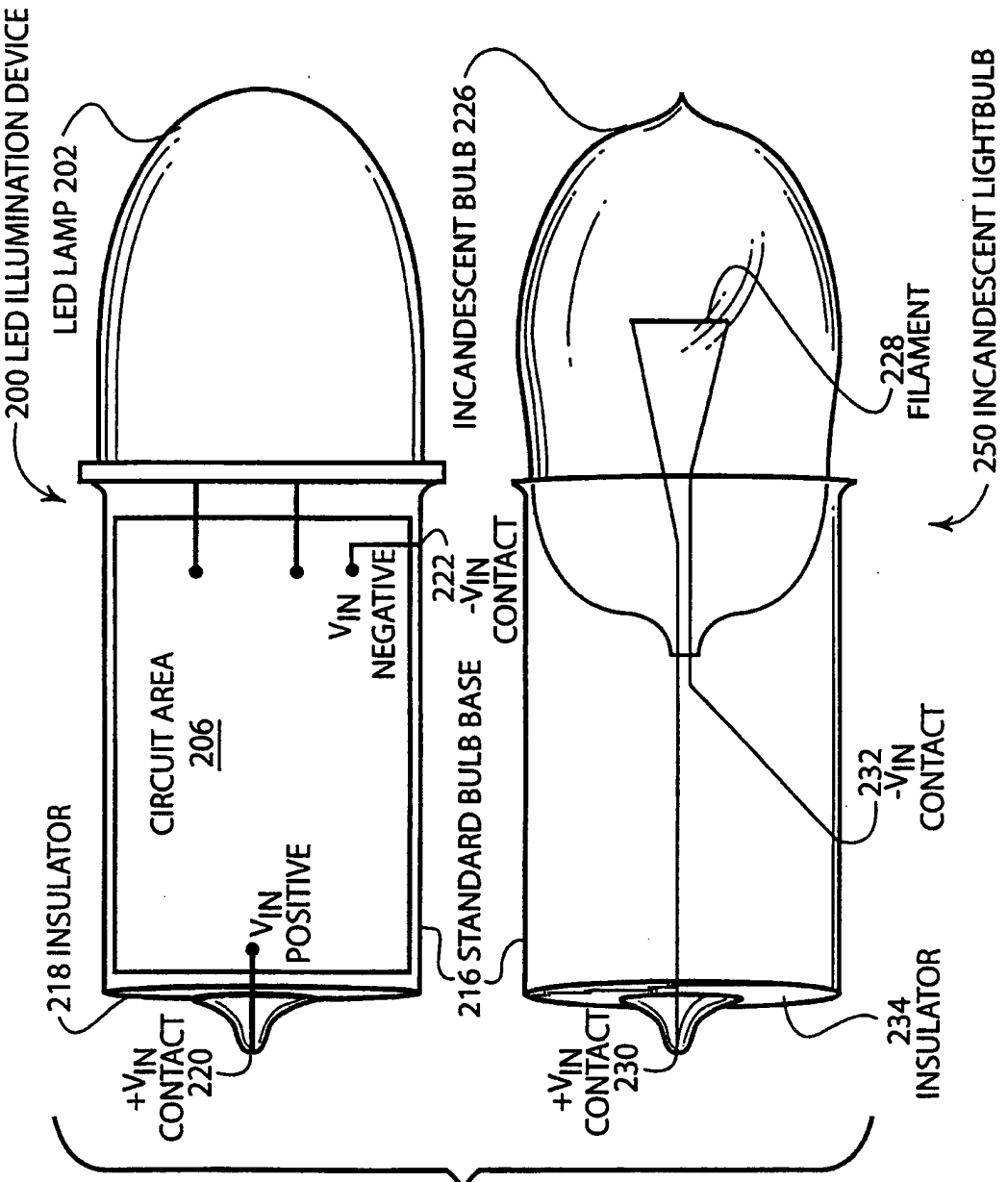

200 LED ILLUMINATION DEVICE
LED LAMP 202
INCANDESCENT BULB 226
228 FILAMENT
250 INCANDESCENT LIGHTBULB
222 -VIN CONTACT
VIN NEGATIVE
CIRCUIT AREA 206
VIN POSITIVE
218 INSULATOR
216 STANDARD BULB BASE
232 -VIN CONTACT
+VIN CONTACT 220
+VIN CONTACT 230
234 INSULATOR

FIGURE 2

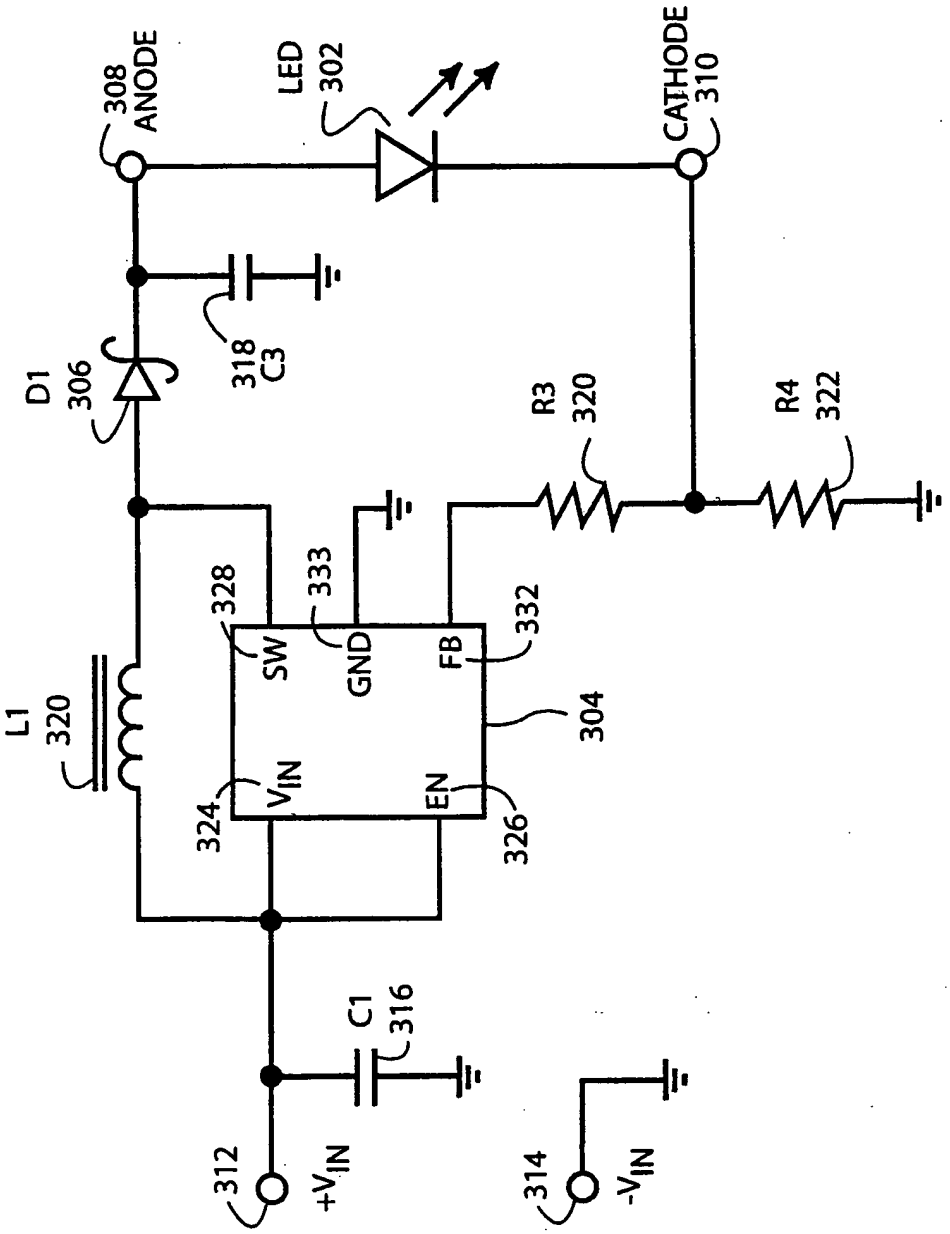
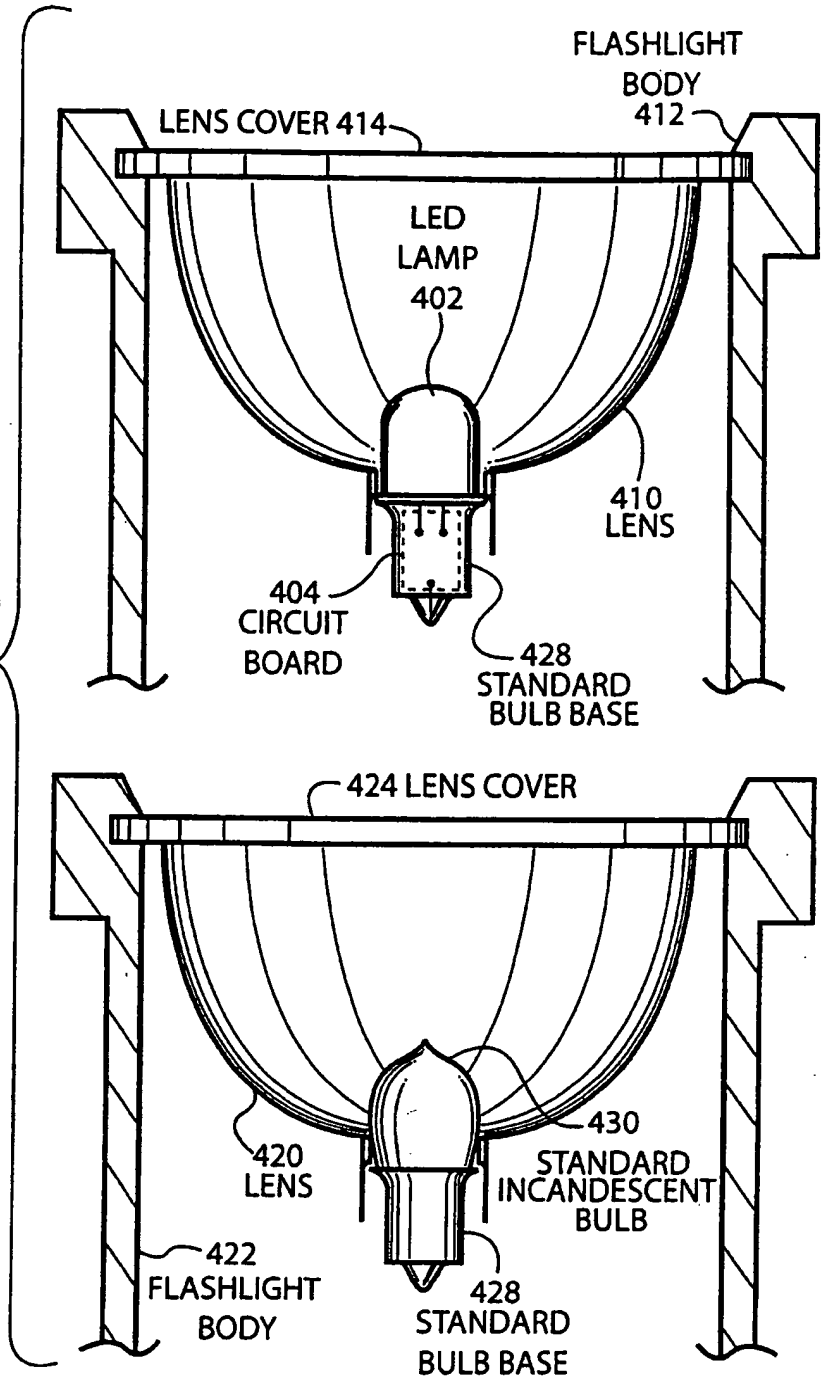

308
ANODE
LED
302
CATHODE
310
318
C3
D1
306
R3
320
R4
322
328
333
332
SW
GND
FB
304
L1
320
324
V_{IN}
EN
326
C1
316
312
$+V_{IN}$
314
$-V_{IN}$

FIGURE 3

FIGURE 4


FLASHLIGHT BODY 412
LENS COVER 414
LED LAMP 402
410 LENS
404 CIRCUIT BOARD
428 STANDARD BULB BASE
424 LENS COVER
420 LENS
430 STANDARD INCANDESCENT BULB
422 FLASHLIGHT BODY
428 STANDARD BULB BASE

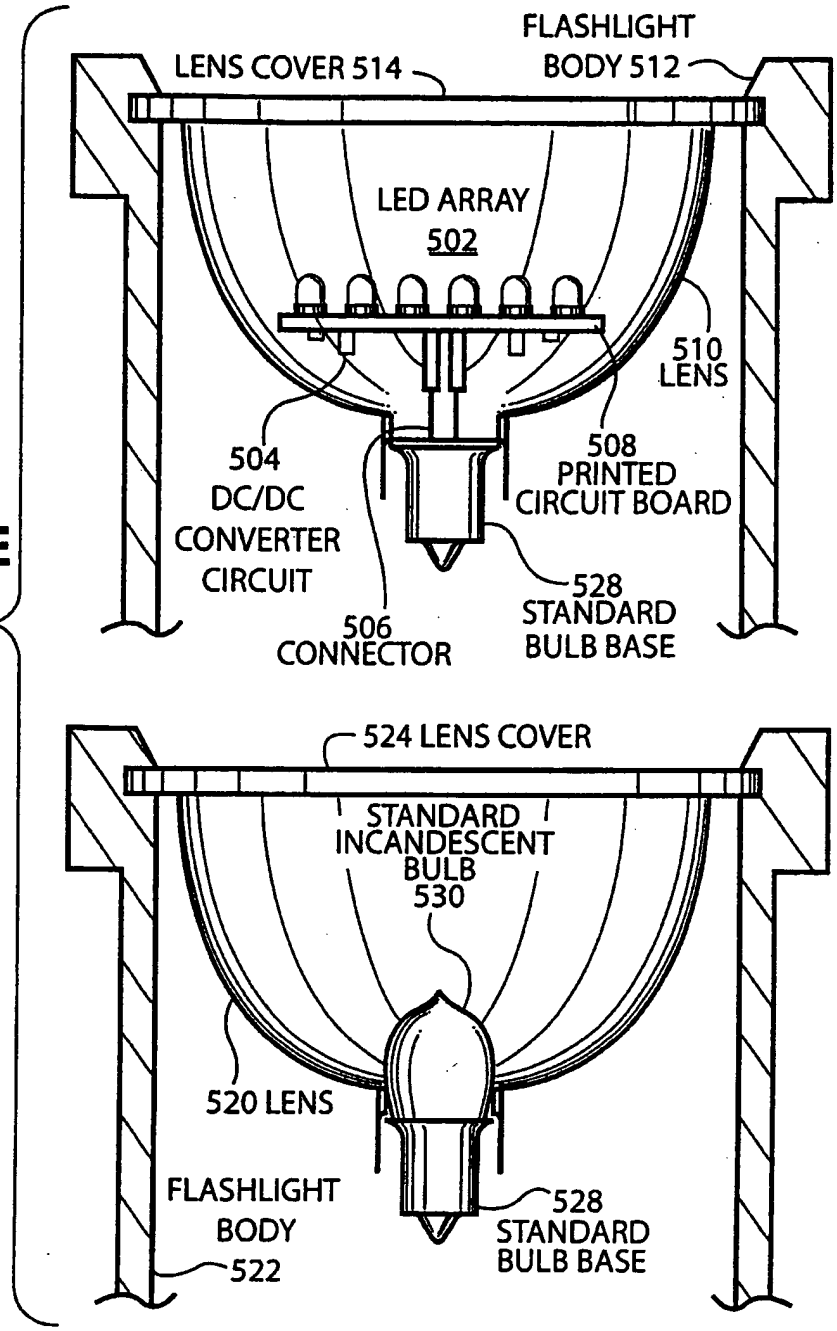

FLASHLIGHT
BODY 512
LENS COVER 514
LED ARRAY
502
510
LENS
504
DC/DC
CONVERTER
CIRCUIT
508
PRINTED
CIRCUIT BOARD
506
CONNECTOR
528
STANDARD
BULB BASE
524 LENS COVER
STANDARD
INCANDESCENT
BULB
530
520 LENS
FLASHLIGHT
BODY
522
528
STANDARD
BULB BASE

FIGURE 5

FIGURE 6

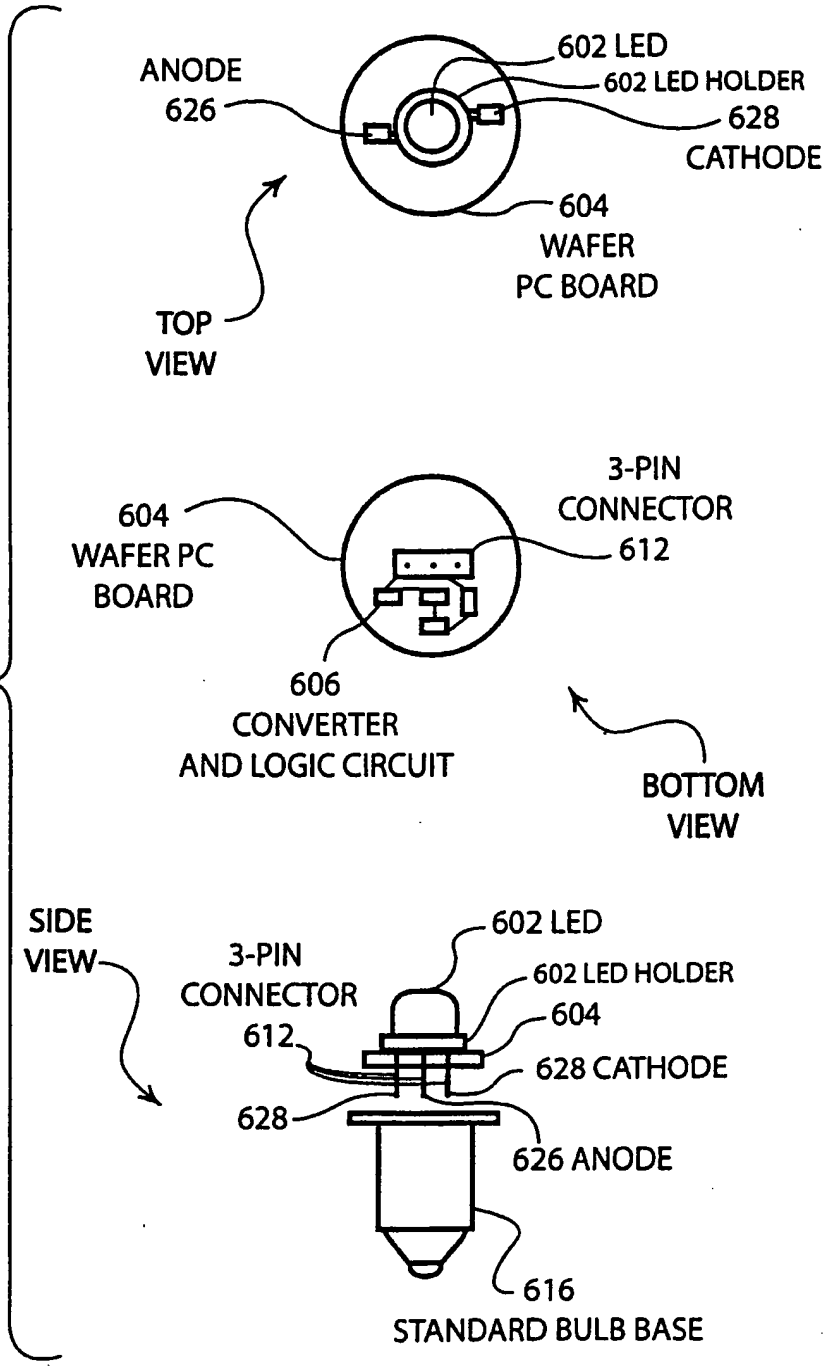
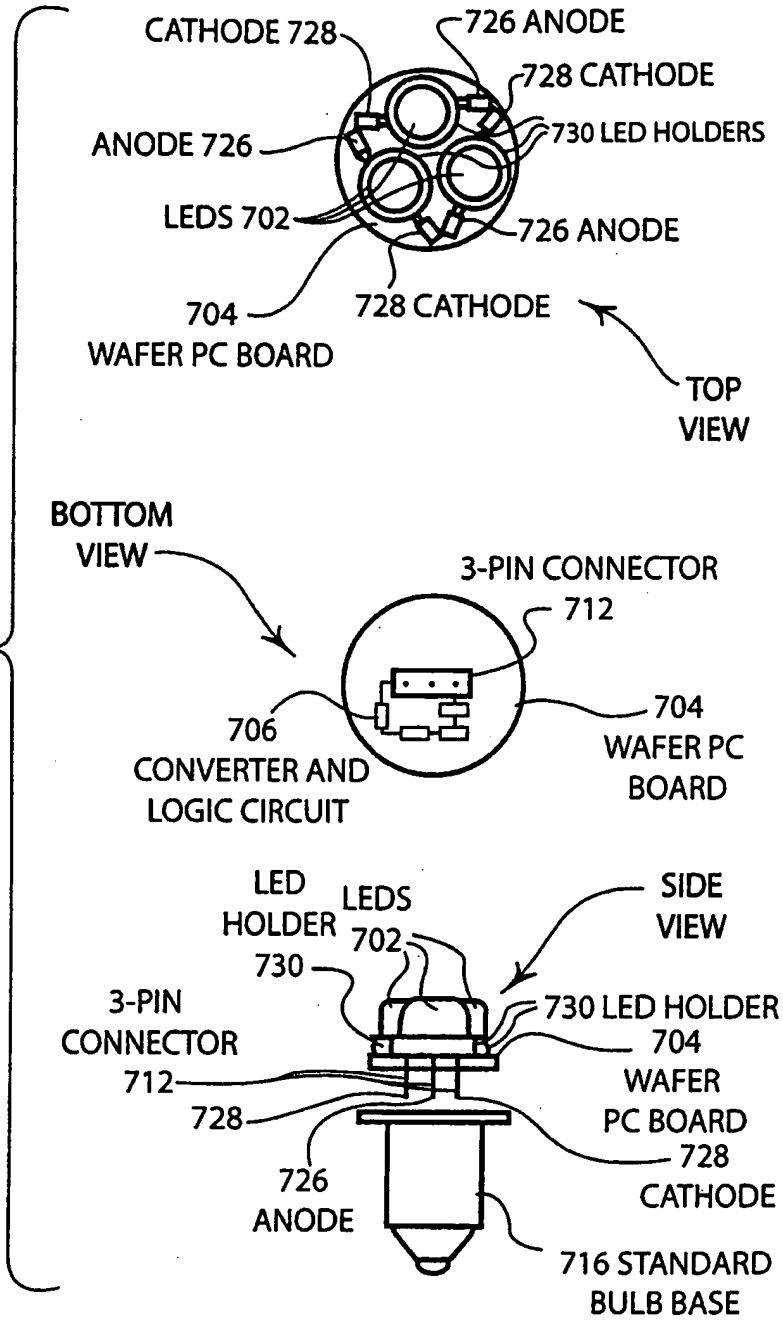

ANODE
626
602 LED
602 LED HOLDER
628
CATHODE
604
WAFER
PC BOARD
TOP
VIEW
604
WAFER PC
BOARD
3-PIN
CONNECTOR
612
606
CONVERTER
AND LOGIC CIRCUIT
BOTTOM
VIEW
SIDE
VIEW
3-PIN
CONNECTOR
612
602 LED
602 LED HOLDER
604
628 CATHODE
628
626 ANODE
616
STANDARD BULB BASE

FIGURE 7


CATHODE 728
726 ANODE
728 CATHODE
730 LED HOLDERS
ANODE 726
LEDS 702
726 ANODE
704
WAFER PC BOARD
728 CATHODE
TOP VIEW
BOTTOM VIEW
3-PIN CONNECTOR
712
706
CONVERTER AND LOGIC CIRCUIT
704
WAFER PC BOARD
LED HOLDER
LEDS
702
730
SIDE VIEW
3-PIN CONNECTOR
712
728
730 LED HOLDER
704
WAFER PC BOARD
728
CATHODE
726
ANODE
716 STANDARD BULB BASE

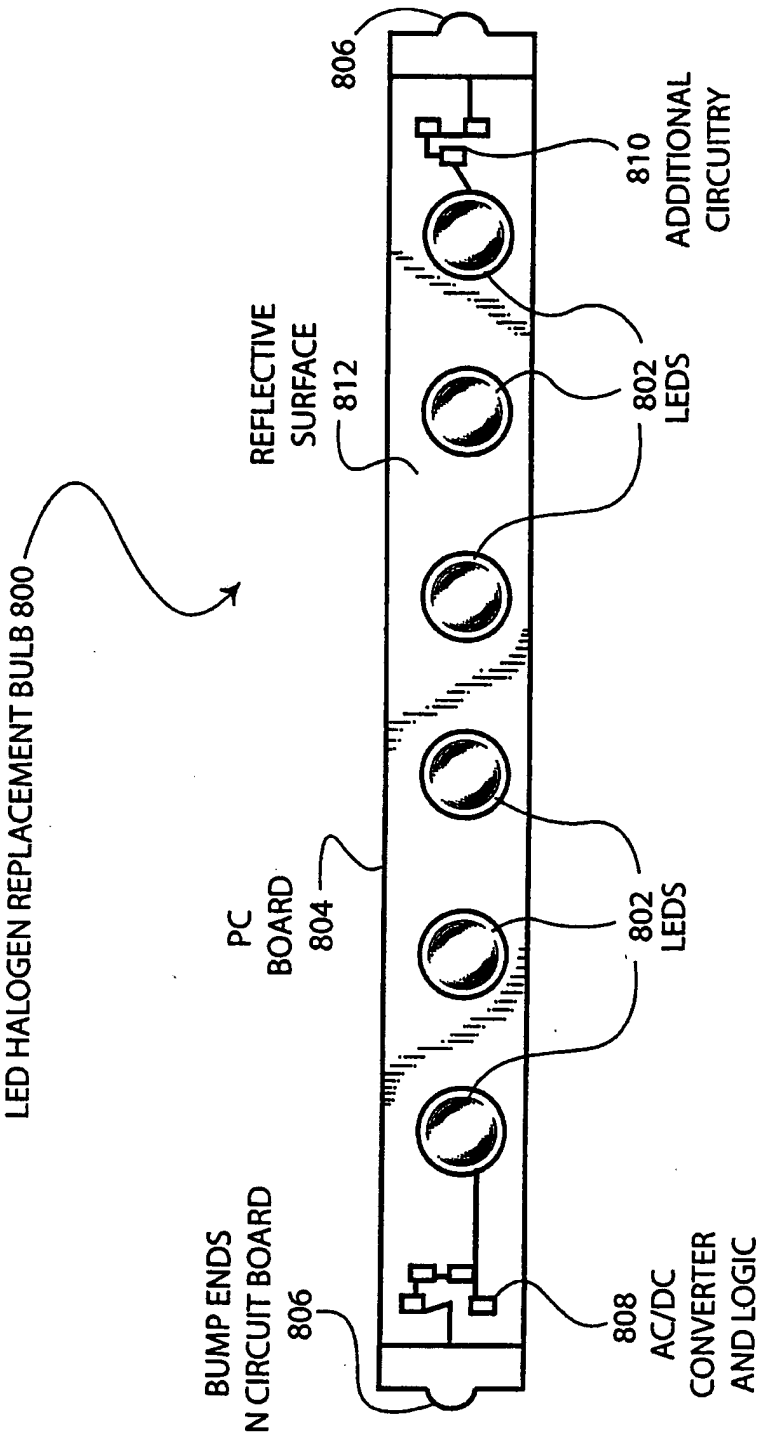
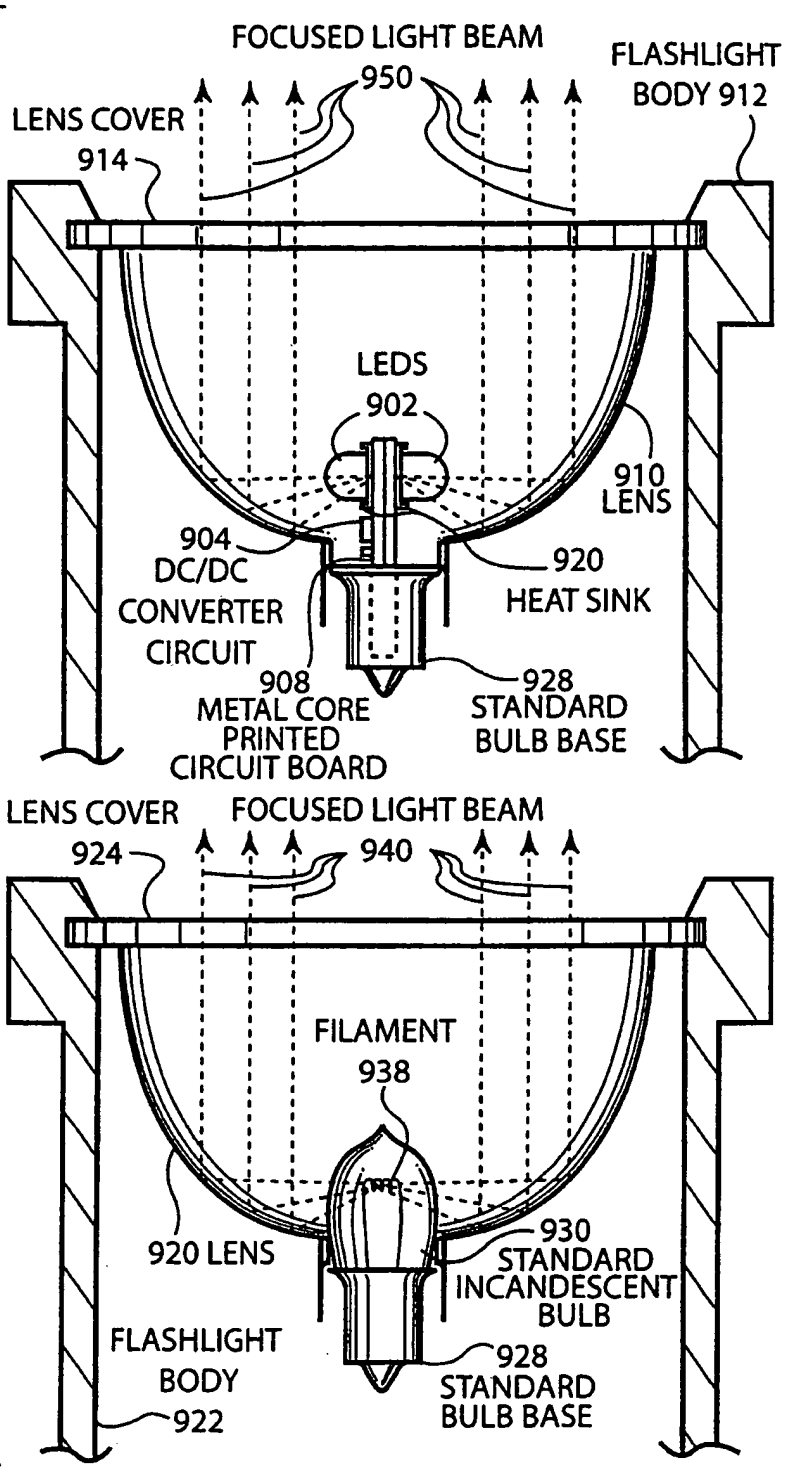

LED HALOGEN REPLACEMENT BULB 800
BUMP ENDS IN CIRCUIT BOARD 806
PC BOARD 804
REFLECTIVE SURFACE 812
806
810 ADDITIONAL CIRCUITRY
802 LEDS
802 LEDS
808 AC/DC CONVERTER AND LOGIC

FIGURE 8

FIGURE 9


FOCUSED LIGHT BEAM
950
FLASHLIGHT BODY 912
LENS COVER
914
LEDS
902
910 LENS
904
DC/DC CONVERTER CIRCUIT
920
HEAT SINK
908
METAL CORE PRINTED CIRCUIT BOARD
928
STANDARD BULB BASE
LENS COVER
924
FOCUSED LIGHT BEAM
940
FILAMENT
938
920 LENS
930
STANDARD INCANDESCENT BULB
FLASHLIGHT BODY
922
928
STANDARD BULB BASE

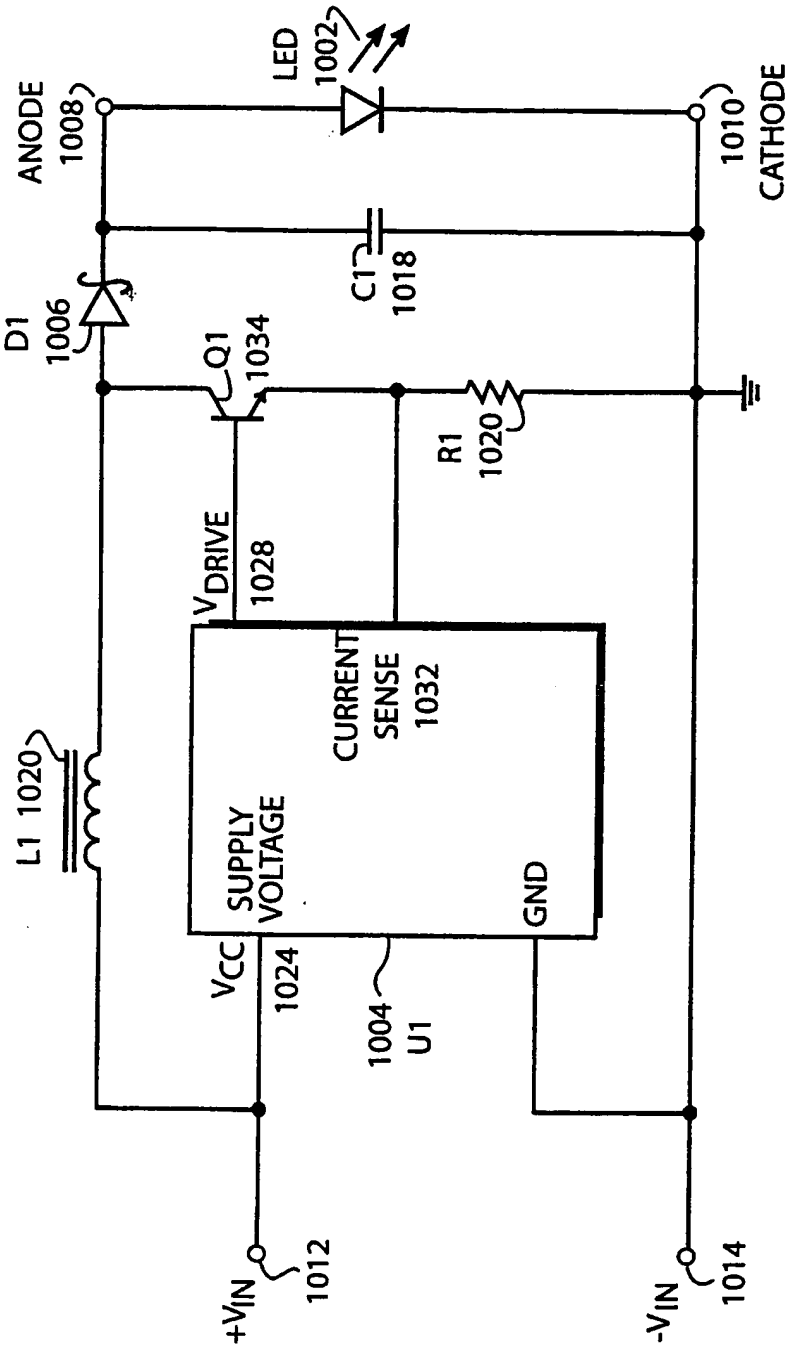

LED
1002
ANODE
1008
CATHODE
1010
C1
1018
D1
1006
Q1
1034
R1
1020
VDRIVE
1028
CURRENT
SENSE
1032
L1 1020
SUPPLY
VOLTAGE
GND
VCC
1024
1004
U1
+VIN
1012
-VIN
1014

FIGURE 10

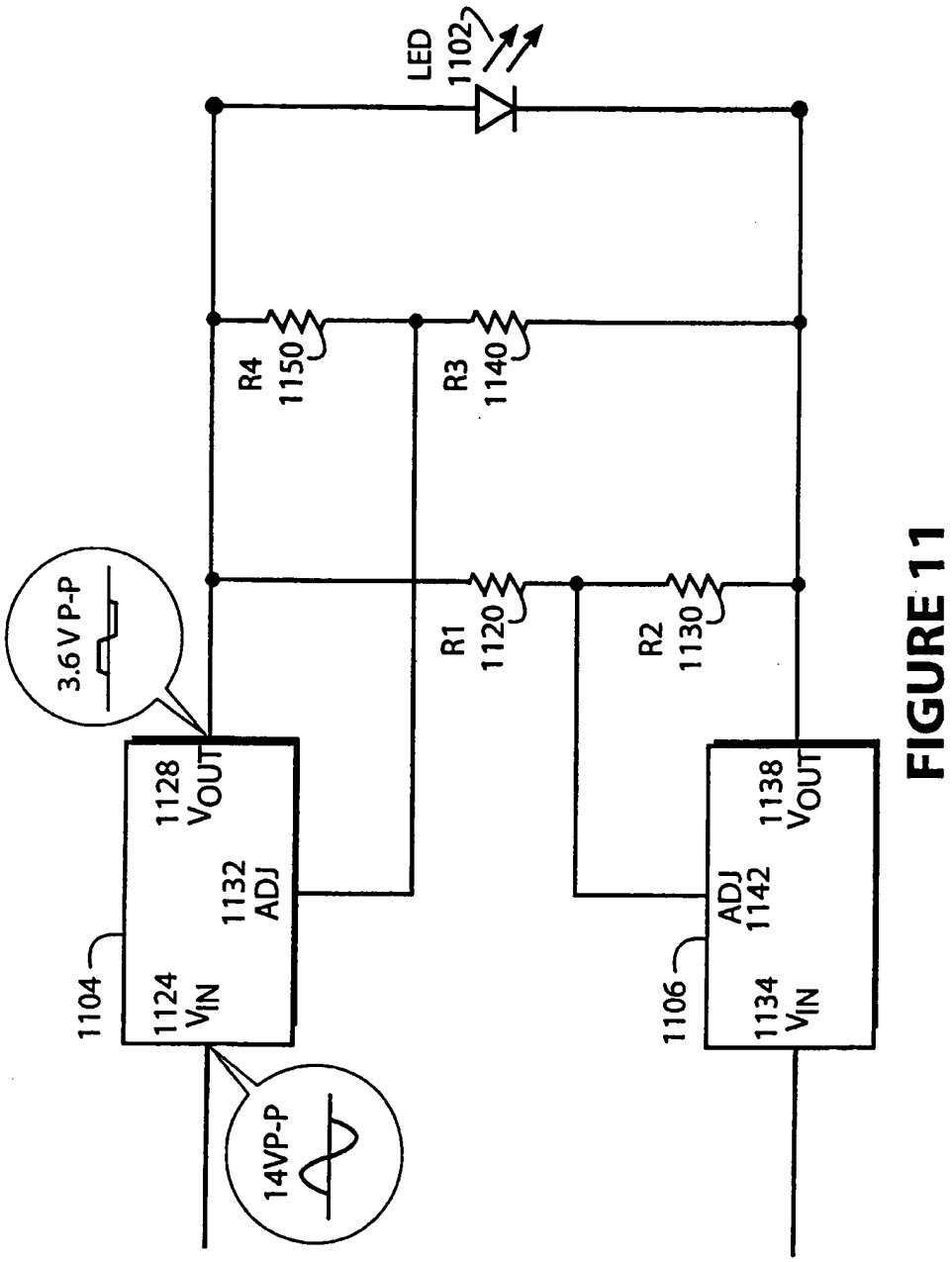

LED
1102
R4
1150
R3
1140
R1
1120
R2
1130
3.6 V P-P
1128
VOUT
1132
ADJ
1124
VIN
1104
14VP-P
1138
VOUT
ADJ
1142
1134
VIN
1106

FIGURE 11